United States Patent Office

3,344,711

Patented Oct. 3, 1967

3,344,711

JAVELIN STABILIZED QUIET ROUND

Robert C. Mawhinney, 4661 Heyer Ave., Castro Valley, Calif. 94546; Bert F. Gould, P.O. Box 820, Berkeley, Calif. 94701; Arthur T. Biehl, General Delivery, and Robert Mainhardt, P.O. Box 225, both of Diablo, Calif. 94528; and William D. Barton, Panama, Panama (P.O. Box 2723, Balboa, Canal Zone)

Filed Feb. 23, 1965, Ser. No. 437,345

11 Claims. (Cl. 89—14)

(Filed under Rule 47(a) and 35 U.S.C. 116)

This application is a continuation-in-part of copending application S.N. 440,046, filed Feb. 11, 1965, "Small Arms Weapon" which is a continuation-in-part of both application S.N. 141,237, filed Sept. 20, 1961, "Small Arms Weapon," now abandoned (which is a continuation-in-part of application S.N. 61,017, filed Oct. 6, 1960, "Small Arms Weapon," now abandoned), and of copending application S.N. 140,090, filed Sept. 22, 1961, "Miniature Disappearing Projectile," now abandoned.

This invention relates to firearms. More particularly it relates to a silent hand weapon.

The development of the modern rifle began approximately in 1320 when Berthold Schwartz, a monk of Freiburg, in Germany, manufactured gun powder after studying the writings of Bacon regarding explosives. Since that time the development of the rifle has continued to the present state of the art as it is known today.

It has been the intent of many inventors and experimenters to eliminate the report generated when a firearm is discharged. Recently, considerable time, expense, and the effort of a large number of people has been expended in attempts to fined a silent weapon. None have been really successful. Various devices have been produced which afford some measure of success in reducing the sound of a rifle, such as silencers, but these devices are merely sound suppressors and only reduce the noise produced. The present invention effects a virtually silent hand weapon in which the movement of the mechanical parts of the weapon are louder than the report of the explosive being detonated within.

A need has grown for a rifle which will shoot a projectile which is noiseless, relatively recoilless, is accurate, at long range, and strikes the target with an impact, with little tissue damage, near or below the threshold of pain. It is often desirable to capture an animal alive without its being harmed and without alerting other animals. Thus a means is needed for propelling a small projectile which will not inflict serious injury or pain on the animal when it strikes, but yet one which will insure that the projectile enters the body sufficiently deep to deliver and transfer a drug to the animal's bloodstream. The means must also be accurate to ensure first that the proper target can be selected from a large group; second that when the animal is hit it does not react to the wound violently enough to disturb the other animals; and third that the report of the delivery means does not disturb the other animals or call attention to the shooter and reveal his position. The present invention provides a complete solution to all of these problems with a new and novel firearm and cartridge.

Briefly, the invention is a small arms hand weapon comprising in combination a smooth bore guide tube means; a cartridge having a combustion chamber and a smooth bore passage communicating therewith, said passage formed for axial alignment with the bore of the launching tube; an elongated projectile in the passage of the cartridge and having an L/D (length over diameter) ratio at least 15/1 and a center of gravity at least 70% of the length from the tail end; a silencer approximately 15 projectile calibers in internal diameter, and approximately 100 projectile calibers in internal length, communicating with the discharge end of the guide tube means, and means for firing the cartridge.

Accordingly, it is an object of the present invention to provide a firearm capable of being fired without a report.

It is a further object of the present invention to provide a firearm capable of launching a projectile which strikes the target close to or below the threshold of pain without tissue damage.

It is another object of the invention to provide a weapon which fires a very small projectile accurately at relatively long range.

Still further objects and advantages of the present invention will become apparent from the accompanying drawings which form a part of the specification.

FIGURE 1 shows a side elevation of the cartridge of the present invention in cross section with a projectile positioned therein.

FIGURE 2 shows a side elevation of the projectile of the present invention in cross section.

FIGURE 3 shows a side elevation of the assembly of the present invention partly in section.

FIGURE 4 shows a side elevation of an alternative embodiment of the present invention partly in section showing the construction thereof.

The cartridge (FIGURE 1), as utilized in a representative and economical embodiment of the invention (effected by altering presently available small arms weapons), is made with a standard .22 caliber long rifle shell **11** case as a basic portion thereof. The standard .22 caliber igniter (not shown) is retained on the interior surface **12** of the combustion chamber. This is generally composed of lead styphanate, but any igniter which would work in a .22 caliber shell will work adequately well for the present invention.

An adapter **13** is made an integral portion of the cartridge case. Generally, the adapter resembles an elongated bullet positioned in the cartridge case, but unlike a bullet it does not separate from the case when the weapon is discharged. The adapter is formed to coaxially nest within the case with a relatively tight fit. After firing, this prevents the escape of the gaseous propellant between the contact surfaces of the case and the adapter. The close tolerances also provide frictional resistance to movement of the adapter with respect to the case. A crimped ring **14** is formed in the cartridge around the case depressing the case into an annular groove **16** in the adapter. This crimp further seals the case to the adapter and prevents the escape of the gaseous propellant or the separation of the case and adapter. Tests have shown that the crimped ring is not necessary and that the cartridge will perform adequately without it when the complete assembly of the weapon is properly designed. If the cartridge is manufactured without the crimp ring it makes the cartridge more readily adaptable for disassembly and reloading. The interiorly extending portion **17** of the adapter contacts the transversally disposed end cover **12**, or flanged cap, of the case. The flanges **18** are standard on most rifle cartridges and are used for positioning the shell in a rifle chamber. The adapter is made to extend into the case to the full depth to secure proper alignment of the adapter in the case. Adapters which only extend to or just past the crimp line are not easily lined up axially with the case portion of each cartridge.

Due to the long length relative to the small diameter of the bore in the adapter portion of the cartridge, a piece of accurately made uniform diameter tubing **19** is used to line the larger bore of the adapter. This permits a larger drill to be used on the adapter with less possibility of drill wander during the bore cutting. The small internal diameter tubing provides the ultimately desired small bore with a higher degree of accuracy and uniformity than can

be achieved by drilling. Hypodermic tubing satisfactorily provides the small diameters and fine tolerances necessary for the cartridge. The tubing is flared on the internal end **21** to prevent it from being blown out of the cartridge. A small crimp **22** is also usually placed in the tube to prevent the projectile **23** from sliding or accidentally being poked back into the combustion chamber during handling. The projectile is prevented from sliding out of the cartridge by a spot of grease or other tacky lubricant. It has proven to work best when the grease is smeared in a light ring around the projectile in the middle of its length before insertion in the cartridge. Any projectile which starts to slide out can be easily pushed back in the barrel. Frangible means could be employed within, or covering the forward end of the bore in the adapter to retain the projectile therein and render this assembly more adaptable to rough handling and eliminate the need for resorting to grease.

A sabot or wad **24** is used to seal the bore of the cartridge. This keeps the propellant from deteriorating and forms a gas seal to prevent blowby when the weapon is fired. The projectiles were first fired without the sabot and performed adequately and one is not necessary. The sabot is added to prevent the possibility of the magnesium tail of the rocket igniting. The sabot is made of Teflon, because of its frictionless qualities, and helps increase the velocity of the projectile by preventing blowby. The sabot also reduces the machining accuracy required in forming the barrel. Another embodiment is effected when a heavy enough nose **26** (FIGURE 2) is used. The tail portion **27** of the projectile can then be made of Teflon and the sabot eliminated. Teflon has high strength and can withstand the axial forces that are imposed upon it. It also has high temperature resistance in addition to its frictionless qualities.

The combustion chamber portion of the cartridge of the present invention is smaller than that of the standard .22 caliber cartridge as a smaller propellant charge is employed. Approximately 7 milligrams of double-based propellant have proven adequate for use in the embodiment of the invention herein described. It would seem that as a general rule, scaling principles with respect to the propellant will hold if other sizes of the weapon are developed.

The cartridge of the present invention was derived from a modified shotgun shell cartridge which fires a ⅛ inch projectile, described in a continuation in part application S.N. 440,046, filed Feb. 11, 1965, Small Arms Weapon. It can be seen from a comparison of the two cartridges that the basic principles and component parts are very similar. Both cartridges use standard shell cases with adapters and elongated projectiles, javelin stabilized or mass stabilized, fired through smooth bore launching tubes. The projectile of the present application is also derived from the same case. It is a solid missile comprised of two materials of different specific gravity, the nose portion generally being made of a heavy metal such as steel, platinum, tungsten, etc., while the tail can be made of solid or tubular magnesium, beryllium, aluminum, a sponge metal, or a synthetic composition material. It is simply a matter of design as to which combination will work having the proper *L/D* ratios and a properly positioned c.g. (center of gravity). Significant compression loading is imposed on the tail of the projectile by the discharge of the weapon, therefore, the material selected must be of sufficient structural strength to withstand the loads. The material must also be able to withstand the heat generated by the propellant unless a heat shield means such as a sabot is used.

Novel and important parameters of the invention are that the projectile should have an *L/D* ratio at least 15/1 and the c.g. should be located at 70% of the length of the projectile from the tail and as far forward as possible. As the ratio becomes larger, increased aerodynamic stability is achieved. The best ratios have been found to be in the neighborhood of 25/1 with 20/1 being the

lower limit of acceptable stability for good accuracy, but not the lower limit for acceptable airworthiness. A ratio of 15/1 will still permit a projectile fired out of a launcher backwards to flip over and reorient itself on target providing the center of gravity is within the parameter of being at least 70% of the length of the projectile forward of the tail end. The further forward the c.g. the better the projectile flies. It appears that the limit to which the c.g. may be advanced is presently around 80% of the length when using a tungsten-magnesium projectile. At that point the c.g. is located forward of the tail end **28** of the rearwardly projecting male stud member **29**. Other combinations of metal may permit moving the c.g. still further forward. Reference to the drawing (FIGURE 2) shows one way to join the tail and nose portions of a projectile as utilized for the present invention. It is a problem that some projectiles have a tendency to separate into their two portions when they emerge from the launching tube; it is believed from being blown apart. This problem is overcome by the magnesium-tungsten combination. The male-female joint between the tail section and the nose is of sufficient strength to keep the parts together when joined with a close tolerance press fit, but adding epoxy serves to help.

It is part of the invention that the two metals can be made of bonded powders. The bonding agent can be water soluble. Thus if the projectile is buried deep in the animal's body, it need not be extracted in order for the animal to recover. The projectile will dissolve and cause no further injury. In fact it becomes simply a suspension of metal particles which only appears as a slight cloud in an X-ray wound area and cannot even be identified as a foreign object in the body.

The projectile as used in this embodiment of the invention is approximately .030″ in diameter while the bore of the cartridge is approximately .033″ in diameter. The length of the projectile is approximately 8/10 of an inch.

The barrel **31** (FIGURE 3) of the launching tube necessarily requires a relatively long bore of very small diameter to effect the stabilization of the projectile. It has been determined that the bore must be at least six times the length of the projectile in order to obtain any range with reasonable accuracy. Barrel lengths have ranged between 6 and 18 inches with comparable results.

The bore of the launching tube was made in an ingenious manner. Since it is very difficult to form a very small bore in solid stock, tubing with the required tolerance was cut to the proper length and clamped between two pieces of solid stock. The stock had opposing mating surfaces with a groove cut therealong for accommodating and supporting the tubing in straight axial alignment. A semi-circular groove was used, but a V groove, or some other relief configuration, which is easy to form in the solid stock, would work equally well. The two halves of the solid stock are held together by clamping means such as screws or rings. The present embodiment is held together by drilled holes through one of the pieces of solid stock and tapped holes in the other. Machine screws are used therewith to clamp the two halves together. Generally any clamping means will suffice.

A silencer **32** is used with the present embodiment. The prior art of silencers teach that they should be approximately six projectile calibers in diameter and approximately ten projectile calibers in length. A representative pressure drop for such a silencer as used with a rifle is from approximately 60,000 p.s.i. in the chamber to 10,000 p.s.i. in the silencer. The present embodiment uses a silencer approximately fifteen projectile calibers in internal diameter and one hundred projectile calibers in internal length which contain the gases of combustion and drop the pressure developed in the cartridge nearly to atmosphere. A small hole **33** at the discharge end of the silencer, approximately .200″ in diameter permits the projectile unrestricted passage. The silencer is large enough in internal volume to contain all the gaseous

volume at one overpressure or less which results from the burning of the propellant. In order to reduce the size of the silencer the internal cavity could be filled with metal turnings such as steel, copper or bronze wool, etc. The passage of the first projectile will clear a path and orient the fibers for subsequent projectiles. Another addition which will work to reduce the noise is lining the interior surface of the silencer with asbestos tape. These two alterations can be used singly or in combination.

The primer activating means (not shown) can utilize any typical arrangement commonly used in rifles or the firearm art wherein a standard cartridge is employed. In this embodiment a rimfire cartridge is used as previously described.

The first working embodiment of the present invention utilized a modified standard .22 caliber rifle (FIGURE 3). The hammer, trigger, and bolt mechanism **34** were retained in standard form. A new barrel was made. Since the cartridge **36** is considerably longer than a standard .22 caliber shell, the standard automatic magazine would not work. One way of manufacturing these launching tubes is to take a standard unrifled .22 caliber barrel and inserting a tubing having an outside diameter which will just fit the .22 caliber barrel and having an internal diameter of the size desired for the projectile. A standard .22 caliber rifle could thereby be modified at a minimum of expense for use with the present invention.

The mechanical operating mechanisms of the weapon portion of the primer activating means generally make more noise than the detonation of the cartridge. Therefore, certain measures can be employed to reduce these noises also, such as rubber shock pads and grommets to prevent metal to metal contact of the operating mechanism. An alternative to this problem is to use electrical ignition. This is a very effective means in that it allows remote control and a different concept of the invention can be employed. A launching tube **37** (FIGURE 4) can be attached or secured to the barrel of a rifle (not shown) with straps, or the like. Then the rifle sights and aiming system can be used to afford accurate delivery of the projectile. It also makes it possible that both a rifle and the present invention can be combined into one effective weapon with the rifle portion available for defense if necessary. This arrangement eliminates the necessity of providing and carrying two separate weapons. The remote electrical ignition can be effected by a simple push button located at any convenient location on the stock of the rifle with one of the small mercury type batteries supplying the small amount of electrical energy necessary. When this type of design is used the cartridge adapter **38** can be an integral unit adapted for mating with the barrel portion by locking means such as threads **39**. The barrel can be fitted with an alignment means for seating the cartridge adapter against the barrel and insuring that proper engagement is effected between the barrel and cartridge adapter for permitting the projectile **41** to transfer from the bore **42** of the cartridge to the bore **43** of the barrel without interference due to misalignment. One such alignment means can be male **44** and female **46** portions on the cartridge and the barrel. The cartridge adapter has an end cap **47** which covers and seals the combustion chamber portion **48** of the adapter. Propellant **49** is positioned in the combustion chamber and electrical ignition means **51** project into the combustion chamber for igniting the propellant. The ignition means can include a primer **52** inside the chamber. A silencer (not shown) can be appended to the forward end of the barrel or the barrel might be tubular with perforated supporting spacers **53** and the gases of combustion rerouted back into the cavity **54** of the barrel.

The present invention possesses many advantages not common to the prior art. It effects one of the greatest advances in history of firearm improvements. By creating a virtually noiseless, painless, recoilless, accurate weapon, the present invention can be used in situations where heretofore the characteristics of a firearm have such undesirable effects that they could not be used and less efficient methods had to be employed.

The fact that a very small projectile is used, lowers the body tissue destruction caused by projectile impact. The projectile hits so quickly and yet is so small that it strikes below the threshold of pain. An accident in development confirmed this fact. The resulting wound is very superficial and almost unnoticeable. If the projectile is made with powdered metal and a soluble binder, it can be left in the wound and will dissolve.

Because the projectile is javelin stabilized, and does not have appreciable spin like a bullet, chemical agents can be simply sprayed on the surface, or the projectile dipped, and the agents will not be thrown off by the centrifugal action which acts on a spinning body. Thus the agents can be affixed with a soft soluble binder permitting quicker absorption into the animal's bloodstream.

Many other embodiments and advantages of the invention can be realized. Although only a couple of embodiments of the iuvention have been depicted, it will be apparent that various modifications and alterations can be made thereto without changing the scope of the invention and therefore the invention is not to be limited except as defined in the following claims.

We claim:

1. A small arms hand weapon comprising in combination

(a) a smooth bore launching tube,

(b) a cartridge having a combustion chamber and a smooth bore passage communicating therewith, said bore formed for axial alignment with the bore of said launching tube,

(c) an elongated projectile in said passage and having an L/D ratio at least 15 to 1 and a c.g. at least 70% of the length from the tail end,

(d) a silencer having an internal volume equal to a cylinder approximately 15 projectile calibers in diameter and approximately 100 calibers in length communicating with the discharge end of said guide tube means, and

(e) means for firing said cartridge.

2. A small arms hand weapon comprising in combination

(a) a smooth bore launching tube at least 6 times the length of the projectile to be launched therethrough,

(b) a cartridge having a combustion chamber and a smooth bore passage communicating therewith, said bore formed for axial alignment with the bore of said launching tube,

(c) an elongated projectile in the passage of said cartridge having an L/D ratio at least 20 to 1 and a c.g. at least 70% of the length from the tail end, said projectile having a nose portion formed of a high density metal and a tail portion of a relatively low density material,

(d) a silencer having an internal volume equal to a cylinder approximately 15 projectile calibers in diameter and approximately 100 calibers in length communicating with the discharge end of said guide tube means, and

(e) means for firing said cartridge.

3. A small arms hand weapon comprising in combination

(a) a smooth bore launching tube at least 6 times the length of the projectile to be launched therethrough,

(b) a cartridge case defining a combustion chamber and having a smooth bore passage communicating with said combustion chamber formed for axial alignment with the bore of said launching tube,

(c) a propellant charge in said combustion chamber,

(d) primer means associated with said cartridge case,

(e) an elongated projectile in said passage and having an L/D ratio at least 15 to 1 and a c.g. at least 70% of the length from the tail end,

(f) a silencer having an internal volume equal to a

cylinder approximately 15 projectile calibers in diameter and approximately 100 calibers in length communicating with the discharge end of said guide tube means, and

(g) means for initiating said primer.

4. A small arms hand weapon comprising in combination

(a) a smooth bore launching tube at least 6 times the length of the projectile to be launched therethrough,

(b) a cartridge case defining a combustion chamber and having a smooth bore passage communicating with said combustion chamber formed for axial alignment with the bore of said launching tube,

(c) a propellant charge in said combustion chamber,

(d) primer means associated with said cartridge case,

(e) an elongated projectile in the passage of said cartridge having an L/D ratio at least 20 to 1 and a c.g. at least 70% of the length from the tail end, said projectile having a nose portion formed of a high density metal and a tail portion of a relatively low density material,

(f) a silencer approximately 15 projectile calibers in internal diameter and approximately 100 calibers in internal length affixed to the discharge end of said guide tube means, and

(g) means for initiating said primer.

5. A silent small arms hand weapon comprising in combination

(a) a smooth bore launching tube at least six times the length of the projectile to be launched therethrough,

(b) a relatively small caliber rimfire cartridge case having a flanged rear wall portion and a cylindrical bore,

(c) a projectile container having a cylindrical rear end portion coaxially inserted within the bore of and engaged with said case, said container having a re-entrant portion at the rear end thereof forming a combustion chamber with said cartridge case rear wall, a smooth bore passage in said container communicating with said re-entrant portion at one end and formed for axial alignment with the bore of said launching tube at the other end,

(d) a propellant charge in the combustion chamber formed by said container and said case,

(e) an elongated projectile less than 30 mils in diameter positioned in the passage of said container, said projectile having an L/D ratio approximately 25 to 1 and a c.g. at least 75% of the length from the rear end thereof, said projectile having a streamlined nose section and a cylindrical body section, said nose section formed of a high density metal and said tail section of a lesser density material, and

(f) a silencer attached to the discharge end of said launching tube, said silencer approximately 15 calibers in internal hollow diameter and approximately 100 calibers in internal hollow length, said silencer having a transversely disposed wall at the discharge end thereof and a bore approximately .200 of an inch in diameter therein in the path of flight of said projectile.

6. The small arms weapon of claim 5 wherein a Teflon sabot is placed in the passage of said container at the rear end of said projectile between said propellant charge and said projectile.

7. The method of forming a small arms hand weapon the steps comprising

(a) inserting a snugly fitting small internal diameter launching tube having a uniform bore into a standard smooth bore .22 caliber rifle,

(b) removing the bullet and powder charge from a standard .22 caliber long rifle cartridge while retaining the standard rimfire percussion primer material therein,

(c) inserting a predetermined accurately measured load of propellant into said emptied cartridge,

(d) inserting coaxially into said cartridge a projectile container having a cylindrical rear end portion formed for mating with said cartridge, said container having a re-entrant portion at the rear end thereof forming a combustion chamber with said cartridge case rear wall, a smooth bore in said container communicating with said re-entrant portion at one end and formed for axial alignment with the bore of said launching tube at the other end,

(e) inserting an elongated projectile less than 30 mils in diameter and smaller than the bore of said launching tube in said bore of said container, said projectile having an L/D ratio approximately 25 to 1 and a c.g. at least 75% of the length from the rear end thereof, said projectile having a streamlined nose section and a cylindrical body section, said nose section formed of a high density metal and said tail section of a lesser density metal,

(f) attaching a silencer to the discharge end of said launching tube, said silencer approximately 15 calibers in internal hollow diameter and approximately 100 calibers in internal hollow length, said silencer having a transversely disposed wall at the discharge end thereof and a bore approximately .200 of an inch in diameter therein in the path of flight of said projectile,

(g) forming alignment means on the forward end of said container and the rearward end of the tube inserted in said rifle, and

(h) inserting said modified .22 cartridge into said modified .22 rifle.

8. The small arms hand weapon of claim 4 wherein said means for igniting said primer is effected by electrical energy.

9. A silent small arms hand weapon comprising in combination

(a) a smooth bore launching tube at least six times the length of the projectile to be launched therethrough,

(b) a cup shaped end case having engagement means integral thereto,

(c) a projectile container having a cylindrical rear end portion coaxially inserted within the bore of and engaged with said case, said container having a re-entrant portion at the rear end thereof forming a combustion chamber with said case rear wall, a smooth bore passage in said container communicating with said re-entrant portion at one end and formed for axial alignment with the bore of said launching tube at the other end,

(d) a propellant charge in the combustion chamber formed by said container and said case,

(e) an elongated projectile less than 30 mils in diameter positioned in the passage of said container, said projectile having an L/D ratio approximately 25 to 1 and a c.g. at least 75% of the length from the rear end thereof, said projectile having a streamlined nose section and a cylindrical body section, said nose section formed of a high density metal and said tail section of a lesser density material, and

(f) a silencer approximately 15 projectile calibers in internal diameter and approximately 100 calibers in internal length affixed to the discharge end of said guide tube means, and

(g) electrical means for igniting said propellant.

10. The small arms weapon of claim 9 wherein a Teflon sabot is placed in the passage of said container at the rear end of said projectile between said propellant charge and said projectile.

11. The small arms weapon of claim 1 wherein said projectile is made of powdered metals bonded by a soluble binding agent.

No references cited.

BENJAMIN A. BORCHELT, *Primary Examiner.*

S. W. ENGLE, *Assistant Examiner.*

Oct. 3, 1967 R. C. MAWHINNEY ETAL 3,344,711

JAVELIN STABILIZED QUIET ROUND

Filed Feb. 23, 1965

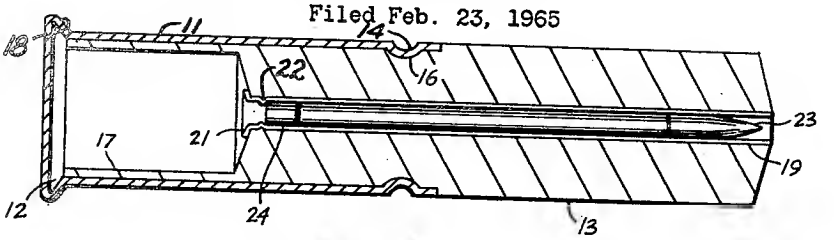

FIG. 1

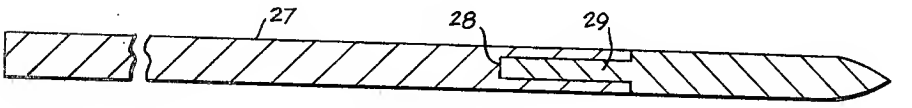

FIG. 2

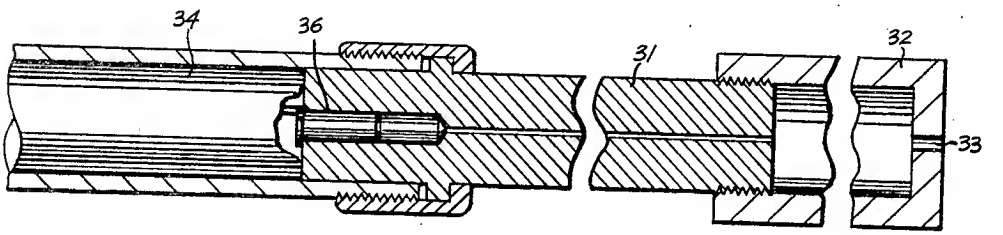

FIG. 3

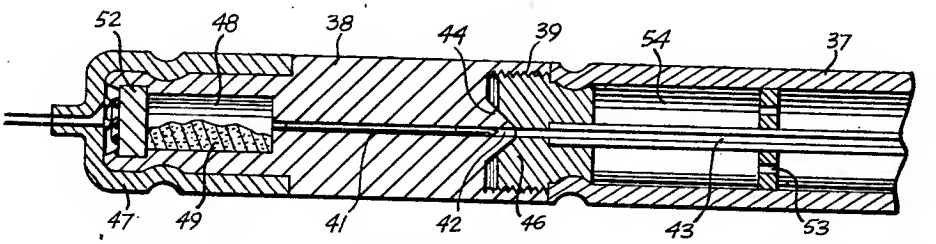

FIG. 4

ROBERT C. MAWHINNEY
BERT F. GOULD
ARTHUR T. BIEHL
ROBERT MAINHARDT
WILLIAM D. BARTON
INVENTORS

BY William L. Greigg
ATTORNEY